

# **In-vitro corrosion studies of plasma sprayed hydroxyapatite coatings fabricated from coprecipitation synthesized powder**

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## **Abstract**

Plasma sprayed bioactive hydroxyapatite (HAp) implants on Ti-6Al-4V substrates have been widely used in load-bearing applications because of their biocompatibility and their intimate contact with bone. In the present study, plasma sprayable grade hydroxyapatite powder was prepared by co-precipitation technique using mixture of precipitating agents and avoiding agglomeration process like spray drying. The powder possessed good flowability and exhibited an average agglomerated size of 87  $\mu\text{m}$ . HAp coating was deposited on Ti-6Al-4V substrate using atmospheric air plasma spraying system. The as synthesized powder exhibited 97% crystallinity, whereas the coating exhibited a crystallinity of 76%. The coating thickness was  $\sim 100\ \mu\text{m}$  and it consisted of mostly fully melted regions and unmelted/partially melted regions. The coating exhibited a surface roughness of 5.7  $\mu\text{m}$ . The present paper discusses detailed corrosion behavior of uncoated and hydroxyapatite coated Ti-6Al-4V in simulated body fluid (Hanks' solution) condition. The HAp coated sample exhibited a smoother anodic curve when compared to uncoated substrate suggesting an improved passive nature of the coated surface. The  $i_{\text{corr}}$  values for the uncoated and HAP coated samples were found to be 20  $\mu\text{A cm}^{-2}$  and 14  $\mu\text{A cm}^{-2}$  respectively. Electrochemical impedance spectroscopy studies showed that the HAp coating applied on to the Ti-6Al-4V alloy does not degrade the corrosion protection of the surface but instead offers an improvement to it.

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